184th WPI-IIIS Seminar

Inhibiting sleep to promote arousal

Sleep is an active process that involves delimited nodes of sleep-promoting cell populations, like galanin-expressing neurons in the ventrolateral preoptic area (VLPO). These neurons are essential for normal sleep and cortical slow wave activity. A highly influential circuit model for behavioral sleep-wake control is the 'flip-flop' model of sleep-state switching, proposing that sleep-wake transitions are regulated by reciprocal inhibition between sleep-promoting VLPO neurons and monoamine wake-promoting nodes in the hypothalamus and brainstem. While VLPO and monoamine neurons exhibit supportive reciprocal connections, VLPO also receives inputs from other brain regions involved in sleep-wake control. In this presentation, I will discuss our data on how VLPO neurons are regulated by afferent inputs and how the internal neuronal circuit within VLPO is crucial for controlling the galanin sleep-promoting neuronal population. I will present recent transcriptomic data aligned with our in vitro electrophysiological and CRACM circuit-based data. To conclude, I will present collaborative work with Dr. Fuller, demonstrating how several of these inputs to VLPO efficiently drive arousal. Our findings identify a novel polysynaptic circuit, including an intra-VLPO inhibitory circuit, through which inhibiting the VLPO galanin population can rapidly induce and sustain arousal. This study originates from several years of collaborative work between our two groups.

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Date: **Tuesday, September 12, 2023**
Time: **11:00 – 12:00**
Venue: **1F Auditorium, IIIS Building**

*On-site participation only

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